ITU-R M.627-1	Technical characteristics for HF maritime radio equipment using narrow-band phase-shift keying (NBPSK) telegraphy	NOC	1995 M-series Fascicle, Part 3, p. 143	S19.83, **S51.41**
ITU-R SF.675-3	Calculation of the maximum power density (averaged over 4 kHz) of an angle-modulated carrier	MOD	1994 SF-series	AP S4 (C8a, footnote)[4]
ITU-R M.690-1	Technical characteristics of emergency position-indicating radio beacons (EPIRBs) operating on the carrier frequencies of 121.5 MHz and 243 MHz	NOC	1995 M-series Fascicle, Part 4, p. 1	**AP S13 (A5, paras 1b and 4.2),** AP S15 (Table S15.2, 121.5 MHz),
ITU-R SF.765	Intersection of radio-relay antenna beams with orbits used by space stations in the fixed-satellite service	NOC	1994 SF-series Fascicle	S21.22, S21.41, S29.12
ITU-R RA.769-1	Protection criteria used for radioastronomical measurements	**MOD**	1995 RA-series Fascicle, p. 5	S5.208A **S5.511A**, S29.12[5]
ITU-R M.821-1	Optional expansion of the digital selective calling system for the maritime mobile service	MOD	1997 series M, Part 3	S54.2
ITU-R M.825-2	Characteristics of a transponder system using DSC techniques for use with vessel traffic services and ship-to-ship identification	MOD	Document 8/1005	S54.2

[4] The reference in this provision is SF.675.

[5] The reference in these provisions is RA.769.

ITU-R IS.847-1	Determination of the coordination area of an earth station operating with a geostationary space station and using the same frequency band as a system in a terrestrial service	NOC	1994 IS-series Volume, p. 1	**AP S5 (Table S5.1, An2 - Tables 2 and 3)**
ITU-R IS.848-1	Determination of the coordination area of a transmitting earth station using the same frequency band as receiving earth stations in bidirectionally allocated frequency bands	NOC	1994 IS-series Volume, p. 31	**AP S5 (Table S5.1)**
ITU-R IS.849-1	Determination of the coordination area for earth stations operating with non-geostationary spacecraft in bands shared with terrestrial services	NOC	1994 IS-series Volume, p. 40	**AP S5 (Table S5.1, An2 - Tables 2 and 3)**
ITU-R SA.1071	Use of the 13.75 to 14.0 GHz band by the space science services and the fixed-satellite service	NOC	1994 SA-series	S5.503A
ITU-R SM.1135	SINPO and SINPFEMO codes	NOC	1995 SM-series Fascicle, p. 47	[ ]
ITU-R SM.1138	Determination of necessary bandwidths including examples for their calculation and associated examples for the designation of emissions	NOC	1995 SM-series Fascicle, p. 50	AP S1 (paras 1 (2) and 2 (3.1))
ITU-R SM.1139	International monitoring system	NOC	1995 SM-series Fascicle, p. 58	S16.2, S16.6
ITU-R IS.1143	System specific methodology for coordination of NGSO space stations (space-to-Earth) operating in the MSS with the fixed service	NOC	1995 IS-series	AP S5 (An 1, paras. 1.2.1 and 1.2.3.2)
ITU-R M.1169	Hours of service of ship stations	NOC	1995 M-series Fascicle, Part 3, p. 157	**S47.26, S47.27, S47.28, S47.29, S50.9**

ITU-R M.1170	Morse telegraphy procedures in the maritime mobile service	NOC	1995 M-series Fascicle, Part 3, p. 162	S51.71, **S52.23, S52.25, S52.31,** S52.32, S52.63, **S52.69, S55.1**
ITU-R M.1171	Radiotelephony procedures in the maritime mobile service	NOC	1995 M-series Fascicle, Part 3, p. 169	S51.71, S52.192, **S52.195,** S52.213, **S52.224,** S52.234, **S52.240, S57.1, AP S13(A2, para. 14A, 1)**
ITU-R M.1172	Miscellaneous abbreviations and signals to be used for radiocommunications in the maritime mobile service	NOC	1995 M-series Fascicle, Part 3, p. 178	**S19.48,** S32.7, AP S13 (Part A1, para. 5)
ITU-R M.1173	Technical characteristics of single-sideband transmitters used in the maritime mobile service for radiotelephony in the bands between 1 606.5 kHz (1 605 kHz Region 2) and 4 000 kHz and between 4 000 kHz and 27 500 kHz	NOC	1995 M-series Fascicle, Part 3, p. 211	**S52.181, S52.229, AP S17 (B, Sect. I (2) and I (6a,b))**
ITU-R M.1174	Characteristics of equipment used for on-board communications in the bands between 450 MHz	NOC	1995 M-series Fascicle, Part 3, p. 213	**S5.287, S5.288**
ITU-R M.1175	Automatic receiving equipment for radiotelegraph and radiotelephone alarm signals	NOC	1995 M-series Fascicle, Part 3, p. 215	**AP S13 (A5, para. 9)**
ITU-R M.1185-1	Method for determining coordination distance between ground based mobile earth stations and terrestrial stations operating in the 148.0 - 149.9 MHz band	**MOD**	Document 8/1019	**AP S5 (An. 1, 3.2, Table 1),** RS 46 (An. 2, Table 1)
ITU-R M.1187	A method for the calculation of the potentially affected region for a mobile-satellite service (MSS) network in the 1 - 3 GHz range using circular orbits	NOC	1995 M-series Fascicle, Part 5, p. 38	**AP S4 (C.11d)**

RESOLUTION 33 (Rev.WRC-97)

BRINGING INTO USE OF SPACE STATIONS IN THE BROADCASTING-SATELLITE SERVICE, PRIOR TO THE ENTRY INTO FORCE OF AGREEMENTS AND ASSOCIATED PLANS FOR THE BROADCASTING-SATELLITE SERVICE

The World Radiocommunication Conference (Geneva, 1997),

considering

a) that while Resolution **507** envisages plans for the broadcasting-satellite service, some administrations might nevertheless feel the need to bring stations in that service into use prior to such plans being established;

b) that administrations should, as far as possible, avoid proliferation of space stations in the broadcasting-satellite service before such plans have been established;

c) that a space station in the broadcasting-satellite service may cause harmful interference to terrestrial stations operating in the same frequency band, even if the latter are outside the service area of the space station;

d) that the procedures specified in Articles **S9** to **S14** and Appendix **S5** of the simplified Radio Regulations contain provisions for coordination between stations in the broadcasting-satellite service and terrestrial stations between space systems in that service and space systems of other administrations;

e) that there are many existing and planned stations in the broadcasting-satellite service not subject to agreements and associated plans that have submitted advance publication information (API) or a request for coordination under the existing Resolution **33 (WARC-79)** procedures and that some administrations are currently in coordination under these procedures;

resolves

1. that, except in those cases where agreements and associated plans for the broadcasting-satellite service have been established and have entered into force, and for satellite networks for which the API or the request for coordination has been received following 1 January 1999 the procedures of Articles **S9** to **S14** shall be applied for the coordination and notification of stations in the broadcasting-satellite service and coordination and notification of other services in respect of that service;

2. that, except in those cases where agreements and associated plans for the broadcasting-satellite service have been established and have entered into force, and for satellite networks for which the API or the request for coordination has been received by the Bureau prior to 1 January 1999 the procedure in sections A to C in this Resolution shall be applied;

3. that a future conference review the requirement for the procedures in this Resolution.

NOC

Section A. Coordination Procedure Between Space Stations in the Broadcasting-Satellite Service and Terrestrial Stations

NOC

Section B. Coordination Procedure Between Space Stations in the Broadcasting-Satellite Service and Space Systems of Other Administrations

NOC

Section C. Notification, Examination and Recording in the Master Register of Assignments to Space Stations in the Broadcasting-Satellite Service Dealt With under this Resolution

ANNEX 2 TO RESOLUTION 46 (Rev.WRC-97)

NOC **A2.1**

MOD **A2.1.1** *Below 1 GHz*[*]

ADD **A2.1.1.1** In the bands 137 - 138 MHz and 400.15 - 401 MHz, coordination of a space station of the mobile-satellite service (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in numbers **S5.204** and **S5.206** as of 1 November 1996) is required only if the power flux-density produced by this space station exceeds -125 dB (W/m^2/4 kHz) at the Earth's surface.

ADD **A2.1.1.2** In the band 137 - 138 MHz, coordination of a space station of the mobile-satellite service (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the power flux-density produced by this space station at the Earth's surface exceeds:

- -125 dB (W/m^2/4 kHz) for networks for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996.
- -140 dB (W/m^2/4 kHz) for networks for which complete Appendix **3**/Appendix **S4** coordination information has been received by the Bureau after 1 November 1996 for the administrations referred to in A2.1.1.1 above.

ADD **A2.1.1.3** In the band 137 - 138 MHz, coordination is also required for a space station on a replacement satellite of a mobile-satellite service network for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996 and the power flux-density exceeds -125 dB (W/m^2/4 kHz) at the Earth's surface for the administrations referred to in A2.1.1.1 above.

NOC **A2.1.2 to A2.1.2.2.2**

MOD **A2.1.2.2.2.1** **Characteristics of reference digital point-to-point systems**

Three different digital systems are described in the following table:

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[*] These provisions apply only to the mobile-satellite service.

- 64 kbit/s capacity used, for example, for outside plant (individual subscriber connection);
- 2 Mbit/s capacity used, for example, for business subscriber connections for the local part of the inside plant;
- 45 Mbit/s capacity used, for example, for trunk networks.

Capacity	64 kbit/s	2 Mbit/s	45 Mbit/s
Modulation	4-PSK	8-PSK	64-QAM
Antenna gain (dB)	33	33	33
Transmit power (dBW)	7	7	1
Feeder/multiplexer loss (dB)	2	2	2
e.i.r.p. (dBW)	38	38	32
Receiver IF bandwidth (MHz)	0.032	0.7	10
Receiver noise figure (dB)	4	4.5	4
Receiver input level for a BER of 10^{-3} (dBW)	–137	–120	–106

Antenna pattern:

$$G(\varphi) = G_{max} - 2.5 \times 10^{-3} \left(\frac{D\varphi}{\lambda}\right)^2 \qquad \text{for } 0 < \varphi < \varphi_m$$

$$G(\varphi) = 39 - 5\log(D/\lambda) - 25\log\varphi \qquad \text{for } \varphi_m \le \varphi < 48°$$

$$G(\varphi) = -3 - 5\log(D/\lambda) \qquad \text{for } 48° \le \varphi \le 180°$$

where:

$G(\varphi)$: gain relative to an isotropic antenna (dBi)

φ: off-axis angle (degree)

D: antenna diameter

λ: wavelength expressed in the same unit as D

G_1: gain of the first side-lobe $= 2 + 15\log(D/\lambda)$

(D/λ may be estimated from $20\log D/\lambda \approx G_{max} - 7.7$)

G_{max}: main lobe antenna gain (dBi)

$\varphi_m = 20(\lambda/D) \times \sqrt{(G_{max} - G_1)}$ (degrees)

It should be noted that the above antenna radiation pattern corresponds to the average side-lobe pattern and it is recognized that individual side-lobes may exceed it by up to 3 dB.

MOD A2.1.2.2.2.2 Characteristics of reference analogue point-to-point systems

Reference circuit	12 hops with 50 km distance between stations
Antenna gain (dBi)	33
e.i.r.p. (dBW)	36
Feeder/multiplexer loss (dB)	3
Receiver noise figure (referred to input of receiver) (dB)	8
Maximum short- and long-term interference in the reference circuit • baseband interfering signal power level not to be exceeded for more than 20% of the time • baseband interfering signal power level not to be exceeded for more than 0.01% of the time	 240 pW0p 50 000 pW0p

Antenna pattern: Use antenna pattern of section A2.1.2.2.2.1.

MOD A.2.1.2.2.2.3 Characteristics of reference point-to-multipoint systems

NOTE - In application of the standard computation program (SCP), the use of the point-to-multipoint reference FS system parameters for the 2 170 - 2 200 MHz band is not required.

Parameter	Central station	Outstation
Antenna type	Omni/Sectoral	Dish/Horn
Antenna gain (dBi)	10/13	20 (analogue) 27 (digital)
e.i.r.p. (max) (dBW) analogue digital	 12 24	 21 34
Noise figure (dB)	3.5	3.5
Feeder/multiplexer loss (dB)	2	2
IF bandwidth (MHz)	3.5	3.5

Antenna pattern:

For the outstation antenna pattern, the reference pattern described in section A2.1.2.2.2.1 is to be used.

The reference radiation pattern for omnidirectional or sectoral antennas is the following:

$$G(\theta) = G_0 - 12\,(\theta/\varphi_3)^2,\ \text{dBi} \qquad 0 \le \theta < \varphi_3$$

$$G(\theta) = G_0 - 12 - 10\log(\theta/\varphi_3),\ \text{dBi} \qquad \varphi_3 \le \theta < 90°$$

where:

G_0 = maximum gain in the horizontal plane (dBi)

θ is the radiation angle above the horizontal plane (degrees)

φ_3 (degrees) is given by:

$$\varphi_3 = \frac{1}{\alpha^2 - 0.818}\ \text{degrees}$$

where:

$$\alpha = \frac{10^{0.1G_0} + 172.4}{191}$$

NOC **A2.1.2.3 Determination of the need for coordination between MSS space stations (space-to-Earth) and terrestrial stations**

MOD **A2.1.2.3.1 Method for the determination of the need for coordination between MSS space stations (space-to-Earth) and other terrestrial services sharing the same frequency band in the 1 to 3 GHz range**

Coordination of assignments for transmitting space stations of the mobile-satellite service with respect to terrestrial services is not required if the power flux-density produced at the Earth's surface or the fractional degradation in performance (FDP) of a station in the fixed service does not exceed the threshold values shown in the following table.

Frequency band (MHz)	Terrestrial service to be protected	Coordination threshold values				
		Geostationary space stations		Non-geostationary space stations		
		pfd (per space station) calculation factors (NOTE 2)		pfd (per space station) calculation factors (NOTE 2)		% FDP (in 1 MHz) (NOTE 1)
		P	*r* dB/deg	*P*	*r* dB/deg	
1 492 - 1 525	analogue FS telephony (NOTE 5)	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	
	all other cases (NOTE 4)	-128 dB(W/m²) in 1 MHz	0.5	-128 dB(W/m²) in 1 MHz	0.5	25
1 525 - 1 530	analogue FS telephony (NOTE 5)	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	
	all other cases	-128 dB(W/m²) in 1 MHz	0.5	-128 dB(W/m²) in 1 MHz	0.5	25
2 160 - 2 2 00 (NOTE 3)	analogue FS telephony (NOTE 5)	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	-141 dB(W/m²) in 4 kHz and -123 dB(W/m²) in 1 MHz (NOTE 6)	0.5	
	all other cases	-128 dB(W/m²) in 1 MHz	0.5	-123 dB(W/m²) in 1 MHz (NOTE 6)	0.5	25

Frequency band (MHz)	Terrestrial service to be protected	Coordination threshold values				
		Geostationary space stations		Non-geostationary space stations		
		pfd (per space station) calculation factors (NOTE 2)		pfd (per space station) calculation factors (NOTE 2)		% FDP (in 1 MHz) (NOTE 1)
		P	*r* dB/deg	*P*	*r* dB/deg	
2 483.5 - 2 500	all other cases	-128 dB(W/m²) in 1 MHz and -146 dB(W/m²) in 4 kHz		-126 dB(W/m²) in 1 MHz and -144 dB(W/m²) in 4 kHz (NOTE 7)	0.65	
2 500 - 2 520	analogue FS telephony (NOTE 5)	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	
	all other cases	-128 dB(W/m²) in 1 MHz	0.5	-128 dB(W/m²) in 1 MHz	0.5	25
2 520 - 2 535	analogue FS telephony (NOTE 5)	-154 dB(W/m²) in 4 kHz and -136 dB(W/m²) in 1 MHz	0.75	-146 dB(W/m²) in 4 kHz and -128 dB(W/m²) in 1 MHz	0.5	
	all other cases	-136 dB(W/m²) in 1 MHz	0.75	-128 dB(W/m²) in 1 MHz	0.5	25

NOTE 1 - The calculation of fractional degradation in performance (FDP) is contained in section A2.1.2.2.1, using the reference FS parameters contained in sections A2.1.2.2.2.1 and A2.1.2.2.2.3. The use of FDP threshold is limited to the case of digital FS systems.

NOTE 2 - The following formula should be used for deriving the coordination threshold in terms of power flux-density:

P	for	$0° \leq \delta \leq 5°$
$P + r(\delta - 5)$	for	$5° < \delta \leq 25°$
$P + 20r$	for	$25° < \delta \leq 90°$

where δ is the angle of arrival (degrees).

The threshold values are obtained under assumed free-space propagation conditions.

NOTE 3 - The coordination thresholds in the band 2 160 - 2 270 MHz (Region 2) and 2 170 - 2 200 MHz (all regions) to protect other terrestrial services do not apply to International Mobile Telecommunication-2000 (IMT-2000) systems, as the satellite and the terrestrial components are not intended to operate in the same area or on common frequencies within these bands.

NOTE 4 - Exceptions for the band 1 492 - 1 525 MHz are as follows:

4.1 For the land mobile service on the territory of Japan (No. **S5.348A**): -150 dB(W/m^2) in 4 kHz at all angles of arrival is applicable to all satellite space-to-Earth emissions.

4.2 For the aeronautical mobile service for telemetry (No. **S5.343**), the requirement for coordination is determined by frequency overlap (No. **S5.348**).

NOTE 5 - In all cases involving sharing with analogue systems for telephony in the fixed service, further coordination is only required when the power flux-density values are greater than or equal to the coordination threshold values in both reference bandwidths.

NOTE 6 - The power flux-density values specified for the band 2 160 - 2 200 MHz provide full protection for analogue radio-relay systems using the sharing criteria established by Recommendation ITU-R SF.357, for operation with a non-GSO MSS system employing narrow-band TDMA/FDMA techniques.

NOTE 7 - The power flux-density values specified for the band 2 483.5 - 2 500 MHz provide full protection for analogue radio-relay systems using the sharing criteria established by Recommendation ITU-R SF.357, for operation with multiple non-GSO MSS systems employing CDMA techniques. The power flux-density values specified will not provide full protection for existing digital fixed systems in all cases. However, these power flux-density values are considered to provide adequate protection for digital fixed systems designed to operate in this band, where high-power ISM equipment and possible low-power applications are expected to produce a relatively high interference environment.

NOC A2.1.2.3.2
to
A2.2

MOD

A2.2.1 *Sharing between feeder links of the non-GSO/MSS (space-to-Earth) and terrestrial services in the same frequency bands*

The power flux-density at the Earth's surface produced by space stations of the fixed-satellite service operating in the space-to-Earth direction in the band 5 150 - 5 216 MHz shall in no case exceed –164 dB(W/m^2) in any 4 kHz band for all angles of arrival.

Emissions from a non-geostationary space station shall not exceed the following limits at the Earth's surface:

Frequency bands	Service	Limit in dB(W/m^2) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0° – 5°	5° – 25°	25° – 90°	
6 700 - 6 825 MHz	Fixed-satellite (S-E)	–137	–137 + 0.5 (δ–5)	–127	1 MHz
6 825 - 7 075 MHz	Fixed-satellite (S-E)	–154 and –134	–154 + 0.5 (δ–5) and –134 + 0.5 (δ–5)	–144 and –124	4 kHz 1 MHz
15.43 - 15.63 GHz	Fixed-satellite (S-E)	-127	5° - 20°: -127 20° - 25°: $-127 + 0.56 (\delta-20)^2$	25° - 29°: -113 29° - 31°: -136.9 + 25 log (δ-20) 31° - 90°: -111	1 MHz

Power flux-density limits between 17.7 GHz and 27.5 GHz.

The power flux-density at the Earth's surface produced by emissions from a space station, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

–115 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

–115 + 0.5(δ-5) dB(W/m^2) in any 1 MHz band for angles of arrival δ between 5 and 25 degrees above the horizontal plane;

–105 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux-density which would be obtained under assumed free-space propagation conditions.

NOC A2.2.2

MOD

A2.2.3 Power flux-density limits produced by non-GSO/FSS in the 20 - 30 GHz band

The power flux-density at the Earth's surface produced by emissions from a space station shall not exceed the following values:

–115 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

–115 + 0.5(δ - 5) dB(W/m^2) in any 1 MHz band for angles of arrival δ between 5 and 25 degrees above the horizontal plane;

–105 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

However, the following values shall apply provisionally to emissions of space stations on non-geostationary satellites in networks operating with a large number of satellites, that is systems with more than 100 satellites (see Resolution **COM5-23**):

–125 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

–125 + (δ - 5) dB(W/m^2) in any 1 MHz band for angles of arrival δ between 5 and 25 degrees above the horizontal plane;

–105 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux-density which could be obtained under assumed free-space propagation conditions.

NOC A2.2.4
to
A2.3.1

MOD

A2.3.2 General considerations

Two types of coordination distances are specified in Tables 1-4: 1) predetermined distances, and 2) distances that are to be calculated on a case-by-case basis, taking into account specific parameters of the earth station for which the coordination area is being determined. Neither of these distances indicate required separation distances.

It must be emphasized that the presence or installation of another station within the coordination area of an earth station would not necessarily preclude the satisfactory operation of either the earth station or the other station, since coordination distances are based on the most unfavourable case assumptions as regards interference.

The different coordination distances may be reviewed at a future conference conforming to the relevant Resolution.

TABLE 1

Earth stations operating at frequencies below 1 GHz

Frequency Sharing Situation		Coordination Distance (In sharing situations involving services allocated with equal rights)
Frequency band and earth station for which coordination area is determined	Other service or station (station in terrestrial service)	
148.0 - 149.9 MHz ground-based (mobile) 149.9 - 150.05 MHz ground-based (mobile)	ground-based stations	As determined using Equation (1) and Figure 1 of Recommendation ITU-R M.1185 In this case, the coordination distance is calculated by the administration of the terrestrial station using the parameters of its terrestrial stations and the relevant parameters taken from the advance publication for the earth station.
400.15 - 401 MHz ground-based	meteorological aids (radiosonde)	580 km
All bands below 1 GHz ground-based	mobile (aircraft)	500 km
All bands below 1 GHz aircraft (mobile)	ground-based stations	500 km
400.15 - 401 MHz aircraft (mobile)	meteorological aids (radiosonde)	1 080 km
All bands below 1 GHz aircraft (mobile)	mobile (aircraft)	1 000 km
454 - 456 MHz 459 - 460 MHz ground-based	ground-based stations	500 km

TABLE 2

Earth stations operating at frequencies in the 1 - 3 GHz range

Frequency Sharing Situation		Coordination Distance (In sharing situations involving services allocated with equal rights)
Frequency band and earth station for which coordination area is determined	Other service or station (station in terrestrial service or earth station)	
ground-based mobile (NOTE 1) (GSO network)	ground-based stations in terrestrial services	Determined using Recommendation ITU-R IS.847 with the parameters specified therein for terrestrial stations and all applicable equations and figures.
ground-based mobile (NOTE 1) (non-GSO network)	ground-based stations in terrestrial services	The methodology of Recommendation ITU-R IS.849 is applied in conjunction with Recommendation ITU-R IS.847 (see above).
1 675 - 1 700 MHz ground-based mobile	meteorological aids (radiosonde)	580 km
All bands 1 - 3 GHz ground-based mobile	terrestrial mobile (aircraft)	500 km
All bands aircraft (mobile)	ground-based stations in terrestrial services	500 km
1 675 - 1 700 MHz aircraft (mobile)	meteorological aids (radiosonde)	1 080 km
All bands aircraft (mobile)	terrestrial mobile (aircraft)	1 000 km

NOTE 1 – Recommendation ITU-R IS.847 supplies the necessary terrestrial station parameters for the bands 1 492 - 1 530 MHz, 1 555 - 1 559 MHz, 1 610 -1 645.5 MHz, 1 646.5 - 1 660 MHz, 1 675 - 1 710 MHz, 1 980 - 2 025 MHz, 2 160 -2 200 MHz, 2 483.5 - 2 520 MHz, and 2 655 - 2 690 MHz.

NOC TABLE 3

NOC TABLE 4

RESOLUTION 121 (Rev.WRC-97)

CONTINUED DEVELOPMENT OF INTERFERENCE CRITERIA AND METHODOLOGIES FOR FIXED-SATELLITE SERVICE COORDINATION BETWEEN FEEDER LINKS OF NON-GEOSTATIONARY SATELLITE NETWORKS IN THE MOBILE-SATELLITE SERVICE AND GEOSTATIONARY-SATELLITE NETWORKS IN THE FIXED-SATELLITE SERVICE IN THE BANDS 19.3 - 19.7 GHz AND 29.1 - 29.5 GHz

The World Radiocommunication Conference (Geneva, 1997),

considering

a) that WRC-95 made provision for use of the bands 19.3 -19.6 GHz and 29.1 - 29.4 GHz by feeder links of non-geostationary-satellite networks in the mobile-satellite service (non-GSO MSS) and this Conference made provision for an additional 2 x 100 MHz in the bands 19.6 - 19.7 and 29.4 - 29.5 GHz;

b) that coordination between feeder links of non-GSO MSS networks, and geostationary-satellite networks in the fixed-satellite service (GSO FSS) and terrestrial networks in these bands will be in accordance with Annex 2 of Resolution **46 (Rev.WRC-97)**/Annex 1 of Appendix **S5**;

c) that simultaneous operation of GSO FSS networks and feeder links of non-GSO MSS networks will in most cases result in short-term, high-level interference between such networks, unless interference mitigation techniques are applied by both types of network;

d) that the CPM Report to this Conference concluded that, of the interference mitigation techniques that were studied, the use of adaptive power control, high-gain antennas and geographic isolation "appear to offer the most benefit in improving the sharing between non-GSO MSS feeder links and GSO FSS networks";

e) that ITU-R has developed a Recommendation containing several alternative methodologies for deriving long-term and short-term interference criteria applicable for sharing between non-GSO MSS feeder links and GSO FSS networks;

f) that further development of the Recommendation in *considering* e) would facilitate the determination of appropriate interference mitigation techniques;

g) that No. **S5.541A** of the Radio Regulations requires the use of interference mitigation techniques in order to facilitate coordination of feeder links of non-GSO MSS networks with GSO FSS networks;

h) that the continued development and implementation of interference mitigation techniques would facilitate the coordination of feeder links of non-GSO MSS networks with GSO FSS networks when the interference between such networks exceeds the applicable permissible interference criteria,

resolves to invite ITU-R

1. to undertake, as a matter of urgency, the continued development of appropriate permissible interference criteria for both non-GSO MSS feeder links and GSO FSS networks operating in the bands 19.3 - 19.7 GHz and 29.1 - 29.5 GHz;

2. to undertake, as a matter of urgency, studies of interference mitigation techniques (including those techniques listed in *considering* d)) which could facilitate coordination between non-GSO MSS feeder links and GSO FSS networks;

3. to undertake, as a matter of urgency, studies to develop coordination methodologies for GSO FSS networks and non-GSO MSS feeder links operating in the bands 19.3 - 19.7 GHz and 29.1 - 29.5 GHz on an equal basis,

urges administrations

to participate actively in the aforementioned studies by submitting contributions to ITU-R,

instructs the Director of the Radiocommunication Bureau

to report on the progress of these studies to WRC-99.

RESOLUTION 212 (Rev.WRC-97)

IMPLEMENTATION OF INTERNATIONAL MOBILE TELECOMMUNICATIONS-2000 (IMT-2000)*

The World Radiocommunication Conference (Geneva, 1997),

considering

a) that ITU-R has recommended the 1 - 3 GHz band as the most suitable for IMT-2000;

b) that ITU-R has recommended approximately 60 MHz for use by personal stations and approximately 170 MHz for use by mobile stations;

c) that ITU-R has recognized that space techniques are an integral part of IMT-2000;

d) that, in No. **S5.388** of the Radio Regulations, this Conference has identified bands to accommodate this future service,

considering further

a) that ITU-R has not completed its studies regarding duplexing methods, modulation techniques, channelling arrangements, signalling or communication protocols;

b) that no worldwide intersystem numbering plan currently exists that would facilitate worldwide roaming,

noting

a) that the implementation of the terrestrial components of IMT-2000 in the bands 1 885 - 2 025 MHz and 2 110 - 2 200 MHz is expected to commence around the year 2000 subject to market and technical considerations;

b) that the availability of the satellite component of IMT-2000 in the bands 1 980 - 2 010 MHz and 2 170 - 2 200 MHz simultaneously with the terrestrial component of IMT-2000 in the bands identified in No. **S5.388** would improve the overall implementation and the attractiveness of IMT-2000 to both developed and developing countries,

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* IMT-2000 was previously known as Future Public Land Mobile Telecommunication Systems (FPLMTS).

invites administrations

to give due consideration to the accommodation of other services currently operating in these bands when implementing IMT-2000,

invites ITU-R

to continue its studies with a view to developing suitable and acceptable technical characteristics for IMT-2000 that will facilitate worldwide use and roaming, and ensure that IMT-2000 can also meet the telecommunication needs of the developing countries and rural areas,

invites ITU-T

a) to complete its studies of signalling and communication protocols;

b) to develop a common worldwide intersystem numbering plan and associated network capabilities that will facilitate worldwide roaming,

resolves

that administrations which implement IMT-2000:

a) should make the necessary frequencies available for system development;

b) should use those frequencies when IMT-2000 are implemented;

c) should use the relevant international technical characteristics, as identified by ITU-R and ITU-T Recommendations.

RESOLUTION 214 (Rev.WRC-97)

SHARING STUDIES RELATING TO CONSIDERATION OF THE ALLOCATION OF BANDS BELOW 1 GHz TO THE NON-GEOSTATIONARY MOBILE-SATELLITE SERVICE

The World Radiocommunication Conference (Geneva, 1997),

considering

a) that the agenda of this Conference included consideration of additional allocations on a worldwide basis for the non-geostationary mobile-satellite service (non-GSO MSS) below 1 GHz;

b) that the Conference Preparatory Meeting 1997, in its Report, indicated that for the non-GSO MSS below 1 GHz there is not enough spectrum currently allocated to allow development of all the systems currently in coordination, and that, in order to meet projected MSS requirements below 1 GHz, a range of an additional 7 to 10 MHz will be required in the near future although, as well, it recognized that a number of these systems may not be implemented for reasons not connected with spectrum availability;

c) that there is an urgent need to make usable spectrum available on a worldwide basis for non-GSO MSS systems operating below 1 GHz;

d) that some non-GSO MSS systems are already operated by some administrations in existing MSS allocations and are at an advanced stage of consideration for operation in many other administrations, and that studies have been conducted within ITU-R on sharing between non-GSO MSS and certain terrestrial services which demonstrate the feasibility of sharing in the cases studied;

e) that issues concerning the technical and operational means to facilitate sharing between the terrestrial services and non-GSO MSS in the bands below 1 GHz remain to be studied;

f) that the requirements for the introduction of these new technologies have to be balanced with the needs of other services having allocations below 1 GHz;

g) that the bands below 1 GHz are extensively used by administrations for many services, although the extent to which they are used by each administration varies throughout the world,

noting

a) that additional studies may identify other bands below 1 GHz which could also be considered suitable for a worldwide allocation to non-GSO MSS;

b) that, based on the sharing techniques being developed for MSS below 1 GHz and the current use of the band 138 - 470 MHz by terrestrial services, this range may be considered for further study;

c) that constraints on the duration of any single transmission from an individual MSS mobile earth station and constraints on the period between consecutive transmissions from an individual MSS mobile earth station operating on the same frequency may facilitate sharing with terrestrial services;

d) that interference mitigation techniques, such as the dynamic channel activity assignment system described in Recommendation ITU-R M.1039-1, may be used by non-GSO MSS systems below 1 GHz in the Earth-to-space direction to promote compatibility with terrestrial systems when operating in the same frequency band;

e) that new technologies employed by some radiocommunication services, especially within the terrestrial mobile and broadcasting services, which require spectrum below 1 GHz, may have an impact on the sharing possibilities;

f) that non-GSO MSS systems operating below 1 GHz have undergone advance publication by the Radiocommunication Bureau and that administrations may seek to implement further such systems;

g) that there may be a need to review constraints on the current allocations to the MSS below 1 GHz,

resolves

1. that further studies are urgently required on operational and technical means to facilitate sharing between the non-GSO MSS and other radiocommunication services having allocations and operating below 1 GHz;

2. that the 1999 World Radiocommunication Conference (WRC-99) be invited to consider, on the basis of the results of the studies conducted within ITU-R and the studies referred to in *resolves* 1 above, additional allocations on a worldwide basis for the non-GSO MSS below 1 GHz;

3. that relevant entities and organizations be invited to participate in these sharing studies;

4. that the 1999/a future competent world radiocommunication conference be invited to consider a review of the technical and regulatory constraints on non-GSO MSS allocations in the bands below 1 GHz, taking into account *considering d)*,

invites ITU-R

1. to study and develop Recommendations, as a matter of urgency, on the performance requirements, sharing criteria and technical and operational issues relating to sharing between both the existing and planned services, and non-GSO MSS below 1 GHz;

2. as a matter of urgency, to carry out studies in preparation for a future competent Conference/(WRC-99), including a review of the operating constraints referred to in *noting c)* necessary to protect the existing and planned development of all of the services to which the bands below 1 GHz are allocated, having regard to *noting d)*;

3. as a matter of urgency, to carry out studies in preparation for a future competent Conference/(WRC-99) with respect to interference mitigation techniques, such as the dynamic channel activity assignment system described in Recommendation ITU-R M.1039-1, necessary to permit the continued development of all of the services to which the bands are allocated;

4. to carry out a review for a future competent conference of the technical and regulatory constraints on non-GSO MSS allocations in the bands below 1 GHz, having regard to *considering d)*;

5. to bring the results of these studies to the attention of the next competent Conference/ (WRC-99) and the relevant preparatory meetings,

urges administrations

1. to participate actively in these studies, with the involvement of both terrestrial and satellite interests;

2. to submit to ITU-R reports on their technical studies and on their operational and frequency sharing experience with non-GSO MSS systems operating below 1 GHz,

encourages administrations

to consider the use of dynamic channel assignment techniques, such as those described in Recommendation ITU-R M.1039-1.

RESOLUTION 215 (Rev.WRC-97)

COORDINATION PROCESS AMONG MOBILE-SATELLITE SYSTEMS AND EFFICIENT USE OF THE ALLOCATIONS TO THE MOBILE-SATELLITE SERVICE IN THE 1 - 3 GHz RANGE

The World Radiocommunication Conference (Geneva, 1997),

considering

a) that space-to-Earth transmissions of mobile-satellite systems are constrained to limit their power flux-density over areas where the frequency band is shared with terrestrial systems;

b) that a number of proposed mobile-satellite systems can provide a good service to users within the power flux-density limits given in Annex 2 to Resolution **46 (Rev.WRC-97)**/Annex 1 to Appendix **S5**;

c) that when maximum communication capacity is achieved by systems in the mobile-satellite service a major portion of the interference into each of these systems will come from the other mobile-satellite systems sharing the frequency band, and, consequently, if one system starts to transmit at higher power, all others need to do the same in order to overcome mutual interference;

d) that ITU-R is studying the efficient use of the radio spectrum and frequency sharing within the mobile-satellite service, that Recommendations ITU-R M.1186 and M.1187 are a basis for further study, and that additional preliminary texts are available or can be provided by administrations on this matter;

e) that, in a codirectional, co-frequency and co-coverage sharing environment, capacities of systems using spread-spectrum multiple-access techniques are affected by technical and operational characteristics of other mobile-satellite service systems using similar multiple-access techniques;

f) that in many parts of the world and in certain frequency bands in the 1 - 3 GHz range, significant congestion already exists due to use by other terrestrial and space services;

g) the need to make most efficient use of frequencies in the MSS allocations,